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ABSTRACT

The number and diversity of the parameters involved in the organization of modern education make it necessary to employ modern management methods and techniques to optimize decisions about the organization and improve the use of available material and financial resources. To accomplish these goals, a systems approach is advisable. A model of any educational institution's activities can be prepared, although the management and scientific administration of services calls for the application of certain modern methods which must be tailored to suit the specific conditions existing. Problem solving methods such as Delphi and brainstorming, as well as data processing systems, can be helpful in improving educational management and encouraging educational development. (Author)

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IMPROVEMENT OF THE MANAGEMENT AND ADMINISTRATION OF EDUCATION SYSTEMS THROUGH THE USE OF MODERN MANAGEMENT METHODS AND TECHNIQUES

by

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The optimization of the management of education systems in the present circumstances of the scientific and technical revolution affecting the whole world raises complex problems, making it a matter of great urgency to improve the standard of management of these systems by the use of modern methods and techniques.

The number and diversity of the parameters involved in the organization of modern education make it particularly necessary to employ modern methods and techniques in the current and long-term management of the education system and to optimize decisions about the organization and use of available material and financial resources.

In this context, we feel it to be a particularly bold and effective step on the part of Unesco, from both the theoretical and practical points of view, to hold a symposium on the management and administration of education. The conclusions which this symposium reaches will be of use in formulating practical recommendations to Unesco's Member States on the use of modern management techniques.

The working document prepared for the participants entitled "Tools for the improvement of school management" provides a solid basis for discussion and at the same time points to the major problems on which the participants must focus their attention.

The report has been prepared on the basis of ample and very strictly scientific documentation and succeeds in presenting the main techniques to be used in the modern management of an educational establishment. It also shows how the modern management techniques described can be applied, and conclusively demonstrates the importance, the necessity and the advisability of applying them in current practice.

Of course, the use of these general management techniques presents certain distinctive features when they are applied to school management, which is very different from that of industrial enterprises, cultural and medical institutions etc. Account also has to be taken of the size of the educational establishment, the level of education it offers (pre-school, primary, secondary or post-secondary) and whether it is a State or private institution.

Starting with a knowledge of all these particular features, the authorities responsible for the administration of educational establishments can adjust and adapt modern management techniques to suit the aims and tasks laid down.

I feel that to establish a wide field for the use of modern management techniques such as analytical models, simulation models, the Delphi method, network analysis, PPBS, cost-benefit and cost-effectiveness analysis, it is advisable to examine and approach managmenent problems via systems theory.

A system is generally defined as a group of elements which form a whole, interact with each other and work together towards a common objective.

The systems approach can be adopted for studying problems in the most varied fields and its use in education, employing the methods and techniques and allowing for the problems specific to it, helps to define the content of a system of an educational type.

One essential characteristic of the systems approach to the problem is the fact that what may be considered a system in one context may in another context be simply a part (or "sub-system") of another system. Thus, an educational institution may be considered as a system of which the elements are the different classes and the administrative services and activities. Alternatively, the national education system may be taken as the sytem proper, in which case each school or educational institution becomes an educational sub-system and each sub-system can be broken down into several smaller sub-systems. A certain hierarchy of systems and a certain number of sub-systems can be established, depending on the complexity of an overall system of education.

If an educational institution (primary or secondary school or university) is considered as a system of education, the various administrative activities form the sub-systems. In the management and administration of services, the sub-systems of an education system are as follows:

1. personnel sub-system: covers activities concerning staff recruitment, training or further training, decisions as to their functions, terms of employment and salaries, assessment of performance, etc.;

2. equipment sub-system: covers activities for the provision of materials, apparatus, books and other items needed in education;

3. educational buildings sub-system: covers the construction of buildings for teaching or facilities such as hostels and canteens, their repair, maintenance, use, etc.;

4. services sub-system: covers pupils' transport, meals, medical services, counselling services, etc.;

5. financial sub-system: covers matters relating to the allocation of the school's financial resources, the distribution of resources among the various activities, preparation of the school's budget, etc.;

6. organization sub-system: covers activities relating to the organization of pupils and students in groups, the organization of school activities during the day, activities relating to communication, co-ordination, decision-making, etc.;

7. programming sub-system: covers all measures connected with determining the duration and location of the various activities;

8. legal activities sub-system: covers activities relating to the drawing up of rules, standards and provisions governing the organizational and legal aspects of education.

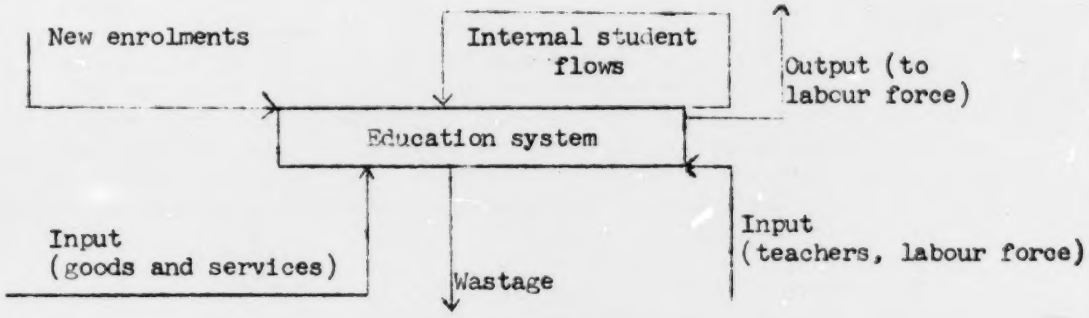
Looking at the activities of any educational institution from a systems viewpoint, we can go on to prepare a model of its activities, providing in this way a wide field for the application of the different models and techniques of management.

In an education system as in any production system, certain relationships can be established between inputs and outputs. When a control or self-regulating factor, generally human, is incorporated into such a system, it may then be called a cybernetic system. In these circumstances, in relation to the time factor, the education system can be included in the group of self-regulating systems having the property of reacting by their own means to various disturbances and retaining autonomous control of their own operation and of the attainment of the initial objective, all of which are characteristics of cybernetic systems.

Starting with the systems approach to the processes and activities which occur within educational institutions, the education system may be studied in accordance with a variety of criteria and improved in accordance with the desired criteria.

Thus, for example, to study the relationship between the education system and other systems ("the outside world"), a model of the system can be employed as in figure 1.

Figure 1



Starting from the concept of the education system, one can go on to prepare a general economic and mathematical model of it.

The main aim of a model of this kind must be to optimize its functional parameters.

If an education system with its respective inputs and outputs is defined by a mathematical operator M which operates on a set of inputs (represented by u_i), to give a set of outputs (represented by v_i), this system can be represented by the equation:

$$M\left[\left\{ u_i (t) \right\} \right] = \left\{ u_i (t) \right\}$$

The operator M is usually pluridimensional and non-linear and the input and output variables are time dependent.

In order for an education system to be expressed in mathematical language using an economic and mathematical model, the aim (usually to minimize costs) and the various constraints it imposes must be expressed in the form of suitable relationships.

To improve the management and administration of educational services and establishments, effective use can be made of modern mathematical methods such as linear programming, the methods made available by inventory control theory, queuing theory, the random depreciation of equipment, methods based on the theory of graphs, simulation methods, etc.

Using these modern mathematical methods and techniques, mathematical models are prepared of the problems which have to be studied and solved.

Taking into account certain constraints imposed by the limited financial and material resources and by limitations of time, mathematical methods based on the objectives to be achieved make an effective contribution to the optimization of the various fields of activity of the education system under consideration.

Linear programming, through the transport method, can ensure optimization of outcomes in the matter of deciding on the best suppliers for a school with several units to be supplied with materials and with suppliers at varying distances. Linear programming can also be used to find the most effective ways of using certain machines and tools in school workshops, e.g. using them to manufacture particular products in particular quantities so as to employ their operating time to the full.

With large-scale education systems, use can be made of inventory control theory to decide on the optimum batches to be procured in the case of materials consumed in large quanities and also to decide on the best method of storage, and using the theory of random depreciation of equipment, the average service life of the various machines or tools used in education can be established as well as the best time to replace them, the most suitable type of machine or tool to adopt, etc.

In calculating where service points should be placed in canteens or libraries, optional solutions can be found by applying queuing theory, whilst in the planning and execution of work such as the construction of new teaching buildings, hostels or canteens or in the preparation of programmes for improving the content of education, network graphs employing critical path analysis or PERT techniques may be used.

Of course, the fields mentioned for the use of these methods are simply illustrations and do not exhaust the wide range of practical possibilities.

The management and scientific administration of services and establishments calls for the application of certain modern management methods which must, nevertheless, be tailored to suit the specific conditions existing. Among these methods, we might mention the Delphi method, "brainstorming", management by exception, the dashboard method, etc.

The Delphi and brainstorming methods may be used by those in charge of a school to find the most effective solutions or to solve new or complex problems and to find ways of improving the existing situation. Both methods start with a wide-ranging consultation of specialists.

By the Delphi method, those in charge of education systems consult experts on problems of major importance, the experts being consulted not in a group but individually. After a first round of discussion, the replies are synthesized and resubmitted to the experts who, in a second round of discussions, may revise their opinions on the basis of the arguments, either agreeing or disagreeing with the opinions of the other experts.

This sequence of individual consultations is continued until the range of opinions and ideas expressed about the problem has been narrowed down.

Unlike the Delphi method, the brainstorming method means consulting experts as a group on problems of major importance, the aim being to stimulate and develop creativity in a group context.

The brainstorming method is based on overcoming the inhibitions of the participants, eliminating fear of making mistakes by doing away with criticism of the ideas put forward. This has the effect of optimizing the ideas or solutions proposed and makes it possible, by a process of selection to single out the most interesting ideas.

Five to twelve persons under the guidance of a chairman may take part in such a discussion, each person being able to express his ideas for five to forty-five minutes and subsequently to make proposals concerning the problem under discussion.

To obtain the best results, it is necessary for the topic under discussion to be delimited and very clearly defined and for the participants to be carefully chosen so that their contribution is as effective as possible.

Management by exception represents another method which may be employed by those in charge of a large-scale education system with complex and varied problems.

By this method, decision-making is delegated to various managerial and administrative bodies, the head of the education system or other executives at the various levels being informed only of deviations from the objectives laid down so that they can take the necessary action.

Dashboard management is based on the need for the chief or those to whom authority has been delegated to receive the necessary information about the way in which activities are developing. For this purpose, a "dashboard" is set up which, by means of a system of indicators, updated in real time, usually on a daily basis, keeps management abreast of the current situation. It also acts as a warning system, indicating deviations from the objectives and providing a basis on which appropriate action can be taken.

Among the modern techniques which can be used to improve educational management, an important place is occupied by automatic data processing techniques.

Increasing complexity in the programming, operating and monitoring of activities required by the efficient functioning of a large-scale education system (primary or secondary school or institution of higher education) makes it necessary to have a system for processing and communicating data so that all organizational levels in the decision-making system are fully informed of each economic process or phenomenon and of the bases on which decisions are to be made.

This can be achieved by developing a data processing system for the functional services, the main aim of which will be the streamlining of the management information system and which will operate by using data processing resources and procedures and modern planning, operating and monitoring methods.

A system of this kind is at present being developed in an institution of higher education in Romania, the aim being to plan, develop and establish a computerized information system for management and the administrative services, i.e. the accounts and finance departments, the planning and personnel departments, the welfare and administrative departments, the secretariat, the printing department and the library.

Institutions of this type have numerous activities which can be computerized, e.g:

1. finance and accounts departments: general and analytical accounting of budgetary appropriations, cash payments and actual costs, stock accounting, central management and canteen management, information about debtors and creditors, and general and analytical information about fixed assets;

2. planning, payroll and personnel departments: provision of statistical information about planning indicators, preparation of staff payslips and records of payments made, and records of the staff of the institution containing the necessary personal data;

3. welfare and administrative departments: records concerning scholarships, students in hostels, canteens, etc.;

4. the secretariat: records concerning admissions to the faculties, student records giving personal data and professional status, the granting of scholarships, the operational programming of activities and the time-tabling;

5. printing departments: calculation of the cost price of the work carried out, calculation of and information about wages, stock management;

6. library departments: records concerning students and books on loan, automatic retrieval of necessary data from the data bank, cataloguing of books, periodicals, authors, etc.

In planning and developing a computerized system of this kind, the management of the educational institution reaps a series of advantages, chief of which are:

(a) increased efficiency in adopting optimal decisions based on information provided at the right time and at the place where the decision is to be made;

(b) availability of accurate information;

(c) the use of mathematical models of data processing, e.g. for elaboration of the operational programming model for teachers by lecture room, time, subject, etc.;

(d) the use of computer methods for the integral exploitation of data employing the techniques of data banks, and the rapid selection of data from data banks using several criteria, e.g. with data about pupils or students, a data base can be prepared making it possible to obtain, in twenty minutes at the most, any statistics or information;

(e) correlation of activities being studied by several operational departments;

(f) enhancement of the possibility of providing real-time data through the computer system in order to carry out various studies and research directed towards the continual improvement of the education system.

The results so far obtained confirm the value and the necessity of using computers in the different departments of educational institutions.

The use of modern management methods and techniques can be a powerful factor for the improvement of the management activities of schools in general, making an effective contribution to increasing the efficiency of the school's work.

The application of certain management methods or techniques must be concentrated in those fields where their use will be most effective, and calls for the necessary preparation and trials to be carried out beforehand.

In the general context of present world interest in scientific management based on the use of modern methods and techniques, the steady improvement of the standards of management and administration of educational services and institutions is a powerful factor for progress in the economy of every country.